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(54) RECORDER AND CHECK PATTERN RECORDING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To facilitate registration by recording a first check pattern, registering a plurality of heads based on the first check pattern, and recording a second check pattern based on the registration results, thereby recording the second check pattern accurately.

SOLUTION: When a check pattern recording command is inputted after a recording medium is set at a paper feed position, paper feed operation is started with a specified paper feed amount and a low resolution registration pattern is recorded substantially in the center of the recording medium while feeding a paper by a specified amount. The recording medium is then discharged by paper discharge operation, the check pattern on the discharged recording medium is observed, a timing set value is inputted in low resolution recording mode and low resolution set parameters are stored in an RAM. Subsequently, the discharged recording medium is set again at the paper feed position, the paper is fed with a second feed amount and recorded with a high resolution registration pattern before being discharged.

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CLAIMS

[Claim(s)]

[Claim 1] A pattern record means to be the recording apparatus which records on a record medium, and to record the check pattern for inspecting the predetermined function of said recording apparatus on a record medium using a recording head, A setting means to set up said predetermined function based on the setting information about a setup of said predetermined function, The 1st check pattern is made to record with said pattern record means. For said setting means The recording device characterized by having the control means which makes the 2nd check pattern record on said pattern record means on the conditions to which said predetermined function was made to set based on the setting information inputted based on this 1st check pattern, and this predetermined function was set.

[Claim 2] It is the recording device according to claim 1 characterized by for said predetermined function being a function to define two or more record physical relationship between recording heads, and for said pattern record means recording said 1st check pattern in predetermined resolution, and recording said

2nd check pattern in resolution higher than this predetermined resolution.

[Claim 3] Said record means is a recording device according to claim 1 or 2 characterized by the ability to record on the 1st check pattern concerned and the location in which it does not interfere when recording said 2nd check pattern on the record medium with which said 1st check pattern was recorded.

[Claim 4] The recording apparatus which is a recording apparatus which records on a record medium, and is characterized by having a recordable pattern record means, without interfering in two or more check pattern mutually at the same record medium using a recording head.

[Claim 5] Said recording head is a recording device according to claim 1 to 4 characterized by recording on a record medium by breathing out ink.

[Claim 6] Said recording head is a recording device according to claim 5 characterized by having the heat energy generating object which generates the heat energy used in order to carry out the regurgitation of the ink.

[Claim 7] The check-pattern record approach which is the check-pattern record approach of the recording apparatus which records on a record medium using a recording head, and is characterized by to have each step which records the 2nd check pattern for inspecting said predetermined function on the conditions to which the 1st check pattern for inspecting the predetermined function of said recording apparatus recorded, said predetermined function set based on this 1st

check pattern, and this predetermined function was set.

[Claim 8] The record approach of the check pattern which is the check pattern record approach of the recording apparatus which records on a record medium, and is characterized by having the step recorded without interfering in two or more check pattern mutually at the same record medium using a recording head.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the recording apparatus which records the check pattern for conducting registration adjustment between two or more detailed recording heads, and inspection of normal record, and its record approach about a recording apparatus and the check pattern record approach.

[0002]

[Description of the Prior Art] The recording apparatus of Bubble Jet can allot the ink delivery of a recording head to high density, and especially has the ink jet recording apparatus typical as this kind of a recording apparatus, and the advantage that highly minute record is attained by this. On the other hand, it is

also one inclination to record an image high-definition with a high definition in the latest recording device.

[0003] In the place, like the equipment which performs full color record, adjusting registration (only henceforth "register adjustment") is known so that each dot formed with the equipment using two or more recording heads in the ink breathed out from these recording heads can maintain position relation, for example, the physical relationship which is formed in the substantial same part on a record medium, and laps mutually. The 1 conventional example of this register adjustment records predetermined check pattern by each head on a record medium, and adjusts the regurgitation timing of each head based on the gap between each pattern.

[0004] Moreover, also when inspecting for every delivery about whether the ink regurgitation is made normally, the ink regurgitation is actually similarly performed on recorded media, and checking this by viewing is performed.

[0005]

[Problem(s) to be Solved by the Invention] However, in the equipment which performs highly minute record, when the check of the conventional register adjustment mentioned above or normal record was performed, there was a case where the adjustment and checking became inadequate.

[0006] That is, since highly minute record is performed, the register adjustment

itself must be performed with high definition. For example, in performing highly minute record of 1200dpi to record of the usual 400dpi in the scanning direction of a recording head, register adjustment of one 3 times the precision of this is needed to the usual register adjustment, and there is a problem that register adjustment takes time amount according to it.

[0007] Moreover, also as for the check pattern recorded on a record medium for register adjustment or the check of the normal regurgitation, it is desirable not to produce a blot etc. to the pattern formed in order to perform a higher definition check. For this reason, it is necessary to use the comparatively expensive thing which a blot cannot produce easily about the record medium used for check pattern record. In this case, when only single check pattern is recorded, for example on the record medium of one sheet, there is a problem that a record medium becomes so useless and causes the rise of a running cost relatively.

[0008] The place which this invention is made in order to cancel the above-mentioned trouble, and is made into the purpose is to offer the recording apparatus and the check pattern record approach which do not spend time amount on register adjustment so much, and do not cause the rise of a running cost by register adjustment, also when performing highly minute record.

[0009]

[Means for Solving the Problem] Therefore, a pattern record means to be the

recording apparatus which records on a record medium, and to record the check pattern for inspecting the predetermined function of said recording apparatus on a record medium in this invention using a recording head, A setting means to set up said predetermined function based on the setting information about a setup of said predetermined function, The 1st check pattern is made to record with said pattern record means. For said setting means It is characterized by having the control means which makes the 2nd check pattern record on said pattern record means on the conditions to which said predetermined function was made to set based on the setting information inputted based on this 1st check pattern, and this predetermined function was set.

[0010] Preferably, said predetermined function is a function to define two or more record physical relationship between recording heads, and it is characterized by for said pattern record means recording said 1st check pattern in predetermined resolution, and recording said 2nd check pattern in resolution higher than this predetermined resolution.

[0011] Still more preferably, said record means is characterized by the ability to record on the 1st check pattern concerned and the location in which it does not interfere, when memorizing said 2nd check pattern to the record medium with which said 1st check pattern was recorded.

[0012] Using a recording head as other gestalten, it is the recording apparatus

which records on a record medium, and it is characterized by having a recordable pattern record means, without interfering in two or more check pattern mutually at the same record medium.

[0013] Moreover, it is the check-pattern record approach of the recording apparatus which records on a record medium using a recording head, and it is characterized by to have each step which records the 2nd check pattern for inspecting said predetermined function on the conditions to which the 1st check pattern for inspecting the predetermined function of said recording apparatus was recorded, said predetermined function was set based on this 1st check pattern, and this predetermined function was set.

[0014] Furthermore, using a recording head, it is the check pattern record approach of the recording apparatus which records on a record medium, and is characterized by having the step recorded without interfering in two or more check pattern mutually at the same record medium.

[0015] Since according to the above configuration the 1st check pattern is recorded first, register adjustment between two or more heads is performed based on this and the 2nd check pattern is recorded based on this result The 1st check pattern can be recorded with a low resolution, and the 2nd check pattern of high resolution can be recorded more under the conditions to which register adjustment based on this was carried out. For example, by this It becomes

possible to record the 2nd check pattern with a sufficient precision, where register adjustment is made to some extent, and subsequent register adjustment becomes easy.

[0016] Moreover, since two or more check pattern is recordable on the same record medium, the record medium for check pattern record can be saved.

[0017]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail with reference to a drawing.

[0018] Drawing 1 is the perspective view showing typically the configuration of the print section in 1 operation gestalt of the ink jet recording device of this invention.

[0019] In drawing 1 , 11a and 11b have the recording head sections 19a and 19b, respectively, it is the head cartridge which can be carried for the ink tanks 12a and 12b corresponding to these head section, enabling free attachment and detachment, and 13 is the carriage for carrying these, enabling free attachment and detachment, and scanning to the head scanning direction in drawing (main scanning direction) in accordance with the guide shafts 15x and 15y. The processing liquid which insolubilizes ink and this on each ink tank 12a and 12b is contained by respectively separate **.

[0020] The mimetic diagram which saw each recording head sections 19a and

19b from the delivery side side is shown in drawing 2 . In this drawing, the line shown with signs 190-194 expresses the row of outlet ports which carries out the regurgitation of processing liquid or the ink.

[0021] The recording head section shown in this drawing (a) and (b) using the two recording head sections (head cartridge) as the equipment of this operation gestalt is shown in drawing 2 (a) and (b) carries out the regurgitation of the processing liquid (S) which it reacts [liquid] with ink and makes the color in ink insolubilize or condense from each delivery of a row of outlet ports 190. Moreover, from each delivery of the row of outlet ports 191 shown in this drawing (a), the regurgitation of the ink of the color of yellow (Y), a Magenta (M), and cyanogen (C) can be carried out, respectively from the row of outlet ports 192,193,194 of the recording head which shows the ink of black (Bk) in this drawing (b) on the other hand. In addition, the row of outlet ports of processing liquid and black arranges 304 deliveries by 600dpi, and the row of outlet ports of yellow, a Magenta, and cyanogen arranges 80 deliveries by 600dpi similarly, respectively. By using these two recording head sections 19a and 19b properly, it can respond to the both sides of a document and a color graphic appropriately, and these images can be recorded.

[0022] In addition, although considered as the configuration of the above heads etc. with this operation gestalt, the carriage which is not restricted to the

configuration of such carriage, a head, etc. and can carry two or more head cartridges may be used for application of this invention, and the head cartridge which had the row of outlet ports of one train per ink 1 color is sufficient as it. Moreover, you may be a head cartridge with two or more rows of outlet ports.

[0023] When drawing 1 is referred to again, it is a conveyance roller for 16 to convey a record medium to a record medium, and for 14 convey it in the recording paper conveyance direction in drawing (the direction of vertical scanning).

[0024] In the above configuration, record to the whole record medium can be performed by performing by turns head scan which records by breathing out processing liquid or ink, and conveyance of a record medium from each delivery of a row of outlet ports, moving the recording head section to a head scanning direction.

[0025] 18 is the delivery side of a recording head, and the cap formed with spring materials, such as rubber which counters, at a home position, and to the recording head, it is supported so that contact/balking may be possible. In order that cap 18 may remove protection, and the processing liquid or ink of the recording head section at the time of un-recording which fixed or may remove the air bubbles which exist in the liquid route opened for free passage and established in a delivery or this, it is used for suction discharge processing of the

compulsory ink by the suction pump (not shown). in order to use the head section which carries out the regurgitation of processing liquid and the ink in this operation gestalt -- cap 18 -- each of processing liquid and ink -- it has the cap sections 18a and 18b for suction recovery etc. This is because it fixes immediately and removal becomes difficult, when processing liquid and ink are mixed.

[0026] 17 is an ink receptacle for the regurgitation recovery action by auxiliary discharge appearance processing of ink. Auxiliary discharge appearance processing is processing which makes air bubbles, dust, the ink which thickened and stopped fitting record, etc. discharge compulsorily to the ink receptacle 17 by making ink breathe out from each delivery of each recording head sections 19a and 19b here.

[0027] The ink used in this operation gestalt contains the water soluble dye containing an anionic radical, water, a water-soluble organic solvent and other components, for example, a viscosity controlling agent, pH regulator, antiseptics, a surfactant, and an antioxidant if needed.

[0028] Moreover, processing liquid contains the water-soluble polymer which has a cationic radical, water, a water-soluble organic solvent and other components, for example, a viscosity controlling agent, pH regulator, antiseptics, a surfactant, and an antioxidant if needed.

[0029] In addition, in this operation gestalt, although the anionic matter is included in ink and the cationic matter is included in processing liquid, it is not necessary to limit especially about the ionicity of ink and processing liquid.

[0030] Examples of usable ink and processing liquid are the following presentations with this operation gestalt.

[0031] Ink BK:C.I. hood black - 2; 3 section glycerol ; 15 **** ; 82 section processing liquid poly allylamine 4 section glycerol 15 **** The ink jet recording device of this operation gestalt which has the configuration of the 81 or more sections is recordable in two kinds of modes. That is, it has two kinds of modes, the low resolution recording mode which records in the comparatively low resolution of 600dpix600dpi about a main scanning direction and the direction of vertical scanning, and the high resolution recording mode which records in the comparatively high resolution of 1200dpix600dpi, and record whose direction of low resolution mode makes a carriage rate quick is performed.

[0032] (Operation gestalt 1) Next, the 1st operation gestalt of the check pattern record for the register adjustment based on the equipment configuration mentioned above is explained.

[0033] Although register adjustment between dot formation locations of the main scanning direction by the recording head sections 19a and 19b is carried out by adjusting regurgitation timing of each head section, with this operation gestalt, it

performs the ink regurgitation from the row of outlet ports 191 concerning Bk ink of recording head section 19a, and the row of outlet ports 193 of M ink of recording head section 196b, and forms check pattern.

[0034] First, as the 1st check pattern, as shown in drawing 3 , check pattern is recorded by the low resolution recording mode. This pattern is recorded on an abbreviation center section about that conveyance direction on a record medium.

[0035] Namely, the recording head sections 19a and 19b are made to scan to the center section of this record medium. About Bk ink, the regurgitation is performed from all the deliveries of a row of outlet ports 191 at intervals of isochronous in the meantime. On the other hand, about M ink The timing of "0" locations set up at the time, To the regurgitation location of the timing it is supposed that M ink laps to the regurgitation location of Bk ink, and Bk ink to namely, the timing of 1 of "-2", "-1", "+1", and "+2" which is 2 dots and the location which shifts to right and left by 1 dot, respectively, respectively The regurgitation is performed from all the deliveries of a delivery 193. In addition, in the case of 600dpi, the amount of [above-mentioned] 1 dot is equivalent to spacing of about 40 micrometers.

[0036] In the example shown in drawing 3 , since it can observe that Bk ink and M ink have lapped in the timing of a location "0", the timing of this location is inputted and set up through the actuation key in which it was prepared by for

example, host equipment or equipment.

[0037] Next, as the 2nd check pattern, as shown in drawing 4 , check pattern is recorded in high resolution mode to the record medium which recorded the 1st check pattern of the above. Under the present circumstances, in order to avoid interference with the 1st check pattern, the 2nd check pattern is recorded above the 1st check pattern about the conveyance direction of a record medium.

[0038] In this case, although check pattern is similarly recorded with the 1st check pattern of the above, timing corresponding to a location "0" is taken as the timing corresponding to the location "0" of this drawing in the timing set up based on the observation result of the 1st above-mentioned check pattern, and the example shown in drawing 3 . and -- further -- respectively -- 1 dot (equivalent to 20 micrometers) -- every -- right and left -- a side -- it records to the timing of the location "-1" shifted and "+1."

[0039] The result of having recorded these 1st and 2nd check pattern is shown in drawing 5 . In the example shown in drawing 4 (drawing 5) as a result of recording the 2nd check pattern, since the regurgitation location of Bk ink and M ink agrees to the timing of a location "-1", the timing corresponding to this location is set up as new timing.

[0040] In addition, control of the check pattern record explained above and a setup of timing data based on the check pattern can be performed by the control

configuration which consists of memory in the equipment shown in drawing 1 ,
such as CPU, and RAM, ROM.

[0041] Drawing 7 is a flow chart which shows the procedure about record of the
1st check pattern and the 2nd check pattern which were mentioned above.

[0042] If a record medium is set to a feed location and there is a predetermined
check pattern record directions input, this processing will be started, feed
actuation of the amount LF 1 of paper feeds is performed at step S701, and,
thereby, the scan field of a recording head can respond to the abbreviation
center section of a record medium. Next, the low resolution register adjustment
pattern (the 1st check pattern) which is the check pattern in a low resolution
recording mode is recorded, performing paper feed of the specified quantity in
the abbreviation center section of a record medium at step S702. Then, a record
medium is discharged in delivery actuation of step S703.

[0043] Here, although a user observes the check pattern on a record medium as
mentioned above, and he inputs the timing setting value in a low resolution
recording mode, he stands by this setting input at step S704. If there is this
setting input, based on that input, the low resolution setting parameter P1 will be
memorized to RAM at step S705. This memorized parameter P1 is used in low
resolution record of BK recording head section 19a and color recording head
section 19b also including record at step S707 shown below.

[0044] Detection of having stood by and set that a user set a record medium to the feed location in step S706, after ending the input of a parameter P1 performs paper feed of feed-per-revolution LF2. Thereby, as mentioned above, the location which should record the 2nd check pattern for high resolutions in a record medium can be made into the location of the upper part distant from the center section. And in step S707, the high resolution register adjustment pattern (the 2nd check pattern) which is the check pattern in a high resolution recording mode is recorded performing paper feed of the specified quantity in the location of the upper part of a record medium, and paper is delivered to a record medium at step S708.

[0045] In the following step S709, the input of the high resolution setting parameter P2 by the user is stood by like step S704, and that value is remembered that there is this input to RAM at step S710. And this value is used in high resolution record of BK recording head section 19a and color recording head section 19b.

[0046] As mentioned above, by a series of processings, while the parameter for register adjustment in each resolution is set up, for example before the processing about register adjustment of high resolution, processing about low resolution register adjustment will surely be performed.

[0047] Since according to check pattern record of this operation gestalt

mentioned above the 1st check pattern under a low resolution is recorded, register adjustment is performed based on that result and the 2nd check pattern in high resolution conditions is recorded after that, the gap in record of this pattern can be suppressed or less to about 1 dot minute by about 1200 dpi, and register adjustment on high resolution conditions can be performed for easy and a short time. Moreover, since a gap is the following by 1 dot, if three patterns, a location "-1", "0", and "+1", are recorded about the 2nd check pattern, respectively, it is sufficient, and record of the check pattern itself can also be performed in a short time.

[0048] Moreover, even when a comparatively expensive record medium is used for recording check pattern, since two check pattern is recorded on the record medium of one sheet, the cost rise about register adjustment is suppressed, and it becomes possible to reduce a running cost as a result.

[0049] Furthermore, since the 1st check pattern is recorded on the abbreviation center section even when a user inserts a record medium in hard flow accidentally, in order to record the 2nd check pattern on the record medium which recorded the 1st check pattern, it can prevent that record of the 2nd check pattern interferes in this.

[0050] In addition, in processing of above-mentioned drawing 7 , the detail of the amount LF 1 of line feeds which is a feed per revolution for recording the check

pattern in a low resolving recording mode makes a feed per revolution until a record medium is sent from a feed location and a recording head opposes the edge of a recording head, and the record medium of A4 size currently assumed from the edge location the amount of about 1/which sends three. Here, 600dpi was made into 2200 units as a unit of delivery. Moreover, LF2 which is a feed per revolution for recording the check pattern in a high resolving recording mode was taken as 100 units from near the edge location of the record medium of A4 size currently assumed like the case of the above LF 1.

[0051] Furthermore, the record section for recording check pattern in a low resolving recording mode, carrying out paper feed of the specified quantity in a center section was made less than into 2000 which is the amount which sends the record medium of A4 size abbreviation $1/3$ further in the feed direction. in order [moreover,] to record, without interfering in the check pattern in a high resolving recording mode with the check pattern in the already recorded low resolution (without lapping in this example) -- the record section of the check pattern in a high resolving recording mode -- a feed direction -- setting -- the record medium of A4 size -- about -- it carried out to less than 2000 that is the amount sent $1/3$.

[0052] (Operation gestalt 2) This operation gestalt can record the check pattern whether the check pattern and the normal regurgitation for register adjustment

are performed, and for no--ization-checking on the record medium of one sheet, and, thereby, can aim at reduction of a running cost like the above-mentioned operation gestalt.

[0053] Drawing 6 is the mimetic diagram showing these examples of check pattern record. As shown in this drawing, the check pattern for register adjustment is recorded on the abbreviation center section of a record medium, and the pattern for a normal regurgitation check which shifted the record location for every delivery about each color ink is recorded caudad.

[0054] In addition, in the ink jet recording apparatus concerning the operation gestalt of this invention, since the processing liquid which insolubilizes ink is used, if it carries out by combining the regurgitation of processing in the case of the above-mentioned check pattern record, an ink blot of check pattern can be suppressed further, and it becomes possible to perform register adjustment with a high precision etc.

[0055] (in addition to this) In addition, especially this invention is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet recording method in order to make the ink regurgitation perform, and brings about the effectiveness which was excellent in the recording head of the method which makes the change of state of ink occur with said heat energy, and the recording device. It is because

the densification of record and highly minute-ization can be attained according to this method.

[0056] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instancy, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No.

4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0057] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, the effectiveness of this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.

[0058] Furthermore, this invention is effectively applicable also to the recording

head of the full line type which has the die length corresponding to the maximum width of the record medium which can record a recording device. As such a recording head, any of the configuration which fills the die length with the combination of two or more recording heads, and the configuration as one recording head formed in one are sufficient.

[0059] In addition, this invention is effective also when the thing of a serial type like an upper example also uses the recording head fixed to the body of equipment, the recording head exchangeable chip type to which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained by the body of equipment being equipped, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one.

[0060] Moreover, as a configuration of the recording device of this invention, since the effectiveness of this invention can be stabilized further, it is desirable to add the regurgitation recovery means of a recording head, a preliminary auxiliary means, etc. If these are mentioned concretely, a preheating means to heat using the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and an auxiliary discharge appearance means to perform the regurgitation different from record can be

mentioned.

[0061] Moreover, although only one piece was prepared also about the class thru/or the number of a recording head carried, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and record color or concentration, more than one may be prepared the number of pieces. That is, although not only the recording mode of only mainstream colors, such as black, but a recording head may be constituted in one as a recording mode of a recording device or the paddle gap by two or more combination is sufficient, for example, this invention is very effective also in equipment equipped with at least one of each of the full color recording mode by the double color color of a different color, or color mixture.

[0062] Furthermore, in addition, in this invention example explained above, although ink is explained as a liquid It is ink solidified less than [a room temperature or it], and what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink may use what makes the shape of liquid at the time of use record signal grant. In addition, in order to prevent the temperature up by heat energy positively because you make it use it as energy

of the change of state from a solid condition to the liquid condition of ink, or in order to prevent evaporation of ink, the ink which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, ink liquefies by grant according to the record signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without grant of heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record medium. The ink in such a case is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0063] Furthermore, in addition, as a gestalt of this invention ink jet recording device, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0064]

[Effect of the Invention] Since according to this invention the 1st check pattern is recorded first, register adjustment between two or more heads is performed

based on this and the 2nd check pattern is recorded based on this result so that clearly from the above explanation The 1st check pattern can be recorded with a low resolution, and the 2nd check pattern of high resolution can be recorded more under the conditions to which register adjustment based on this was carried out. For example, by this It becomes possible to record the 2nd check pattern with a sufficient precision, where register adjustment is made to some extent, and subsequent register adjustment becomes easy.

[0065] Moreover, since two or more check pattern is recordable on the same record medium, the record medium for check pattern record can be saved.

[0066] Consequently, it becomes easily possible about register adjustment etc. to be able to carry out in a short time and to reduce the running cost of equipment.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the typical perspective view showing the main configurations of the ink jet recording device concerning 1 operation gestalt of this invention.

[Drawing 2] It is the mimetic diagram showing the delivery array of the recording

head used with the above-mentioned equipment.

[Drawing 3] It is drawing for explaining record of the 1st check pattern for register adjustment concerning the 1st operation gestalt of this invention.

[Drawing 4] It is drawing for explaining record of the 2nd check pattern furthermore recorded after record of the 1st check pattern.

[Drawing 5] It is drawing showing the condition of having recorded the 1st and 2nd check pattern of the above on the record medium of one sheet.

[Drawing 6] It is drawing showing the check pattern concerning the 2nd operation gestalt of this invention.

[Drawing 7] It is the flow chart which shows the procedure about record of the 1st and 2nd check pattern in the 1st operation gestalt.

[Description of Notations]

11a, 11b Head cartridge

12a, 12b Ink tank

19a, 19b Recording head section

190 191,192,193,194 Row of outlet ports